

CLAIMS

1. A rubber hose having an outer rubber layer laminated by means of extrusion on the outer peripheral surface of an inner rubber layer, wherein:

5 the inner rubber layer is a fluororubber layer;

the outer rubber layer is a reinforcing yarn-woven silicone rubber layer having reinforcing yarns woven therein;

10 an intermediate rubber layer having an adhesive component for the adhesion with said fluororubber layer is provided between said fluororubber layer and said reinforcing yarn-woven silicone rubber layer; and

15 the intermediate rubber layer is an intermediate silicone rubber layer having a hardness lower than those of said reinforcing yarn-woven silicone rubber layer and said fluororubber layer.

2. The rubber hose according to claim 1, in which the fluororubber comprises a terpolymer of vinylidene fluoride, hexafluoropropylene and tetrafluoropropylene or a copolymer 20 of tetrafluoroethylene and propylene.

3. The rubber hose according to claim 1, in which the thickness of the fluororubber layer is set at 0.2 to 1.5 mm.

25 4. The rubber hose according to claim 1, in which the material hardness of the intermediate silicone rubber layer is lower by 10 to 30 in terms of the JIS A hardness than those of the

reinforcing yarn-woven silicone rubber layer and the innermost fluororubber layer.

5. The rubber hose according to claim 1, in which the
5 thickness of the intermediate silicone rubber layer is set
at 0.3 to 2 mm.

6. The rubber hose according to claim 1, in which the
fluororubber layer comprises 5 to 40 parts by weight of aramid
10 staple fibers in relation to 100 parts by weight of the raw
material polymer.

7. The rubber hose according to claim 1, in which the
fluororubber layer comprises 0.5 to 10 parts by weight of a
15 silicone oil in relation to 100 parts by weight of the raw
material polymer.

8. The rubber hose according to claim 1, in which the
intermediate silicone rubber layer comprises 2 to 15 parts
20 by weight of magnesium oxide in relation to 100 parts by weight
of the raw material polymer.

9. The rubber hose according to claim 1, in which the
intermediate silicone rubber layer comprises 1 to 15 parts
25 by weight of triallyl isocyanurate in relation to 100 parts
by weight of the raw material polymer.

10. The rubber hose according to claim 1, in which the intermediate silicone rubber layer comprises 0.5 to 10 parts by weight of a silane coupling agent in relation to 100 parts by weight of the raw material polymer.

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11. The rubber hose according to claim 1, in which a silicone release agent is applied onto the inner peripheral surface of the fluororubber layer in the joining portion to a counterpart pipe to be inserted therein.

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12. The rubber hose according to claim 1, in which a plurality of ribs are provided along the circumferential direction in a protruding manner on the inner peripheral surface of the fluororubber layer in the joining portion to a counterpart 15 pipe to be inserted therein.

13. The rubber hose according to claim 1, in which an organosilane adhesive is applied between the fluororubber layer and the intermediate silicone rubber layer.

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14. A method for manufacturing a rubber hose by means of extrusion in which an intermediate silicone rubber layer is provided between a fluororubber layer and a reinforcing yarn-woven silicone rubber layer outside thereof, the 25 intermediate layer having a hardness lower than those of the reinforcing yarn-woven silicone rubber layer and the innermost fluororubber layer, wherein:

the fluororubber layer, the intermediate silicone rubber layer containing an adhesive component for the adhesion with said fluororubber layer, the intermediate layer having a hardness lower than those of said fluororubber and said
5 reinforcing yarn-woven silicone rubber outside thereof, and the reinforcing yarn-woven silicone rubber underlayer are extruded in a laminated condition by a first extruder to feed the resulting laminate to a weaving machine;

the weaving machine weaves reinforcing yarns on the outer
10 peripheral surface of the reinforcing yarn-woven silicone rubber underlayer to feed the woven laminate to a second extruder; and

the second extruder coats the outer peripheral surface of the reinforcing woven yarns with a reinforcing yarn-woven
15 silicone rubber upper layer.

15. The method for manufacturing a rubber hose according to claim 14, in which the reinforcing woven yarns and/or the silicone rubber upper layer are formed in multilayer forms.

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16. The method for manufacturing a rubber hose according to claim 14, in which a silane coupling agent is applied onto the outer peripheral surface of the fluororubber layer,
wherein:

25 the lamination by the first extruder of the fluororubber layer, the intermediate silicone rubber layer having a hardness lower than those of said fluororubber layer and said

reinforcing yarn-woven silicone rubber layer and the reinforcing yarn-woven silicone rubber underlayer is carried out by:

extrusion of the fluororubber layer by an upstream, first
5 extruder;

application of the silane coupling agent by a silane coupling agent applicator; and

extrusion of the intermediate silicone rubber layer and the reinforcing yarn-woven silicone rubber underlayer by a
10 downstream, first extruder.

17. A rubber hose having an outer rubber layer laminated by means of winding on the outer peripheral surface of an inner rubber layer, wherein:

15 the inner rubber layer is a fluororubber layer;

the outer rubber layer is a fabric-reinforced silicone rubber layer;

an intermediate silicone rubber layer containing an adhesive component for the adhesion with the fluororubber layer
20 is provided between the fluororubber layer and the fabric-reinforced silicone rubber layer; and

the intermediate rubber layer is an intermediate silicone rubber layer having a hardness lower than those of the fabric-reinforced silicone rubber layer and said fluororubber
25 layer to be the innermost layer.

18. The rubber hose according to claim 17, in which the fluororubber is composed of a terpolymer of vinylidene fluoride, hexafluoropropylene and tetrafluoropropylene or a copolymer of tetrafluoroethylene and propylene.

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19. The rubber hose according to claim 17, in which the thickness of the fluororubber layer is set at 0.2 to 1.5 mm.

10 20. The rubber hose according to claim 17, in which the material hardness of the intermediate silicone rubber layer is lower by 10 to 30 in terms of the JIS A hardness than those of the reinforcing yarn-woven silicone rubber layer and the fluororubber layer.

15 21. The rubber hose according to claim 17, in which the thickness of the intermediate silicone rubber layer is set at 0.3 to 2 mm.

20 22. The rubber hose according to claim 17, in which the fluororubber layer comprises 5 to 40 parts by weight of aramid staple fibers in relation to 100 parts by weight of the raw material polymer.

25 23. The rubber hose according to claim 17, in which the fluororubber layer comprises 0.5 to 10 parts by weight of a silicone oil in relation to 100 parts by weight of the raw material polymer.

24. The rubber hose according to claim 17, in which the intermediate silicone rubber layer comprises 2 to 15 parts by weight of magnesium oxide in relation to 100 parts by weight
5 of the raw material polymer.

25. The rubber hose according to claim 17, in which the intermediate silicone rubber layer comprises 1 to 15 parts by weight of triallyl isocyanurate in relation to 100 parts
10 by weight of the raw material polymer.

26. The rubber hose according to claim 17, in which the intermediate silicone rubber layer comprises 0.5 to 10 parts by weight of a silane coupling agent in relation to 100 parts
15 by weight of the raw material polymer.

27. The rubber hose according to claim 17, in which a silicone release agent is applied onto the inner peripheral surface of the fluororubber layer in the joining portion to a
20 counterpart pipe to be inserted therein.

28. The rubber hose according to claim 17, in which a plurality of ribs are provided along the circumferential direction in a protruding manner on the inner peripheral surface of the
25 fluororubber layer in the joining portion to a counterpart pipe to be inserted therein.

29. The rubber hose according to claim 17, in which an organosilane adhesive is applied between the fluororubber layer and the intermediate silicone rubber layer.

5 30. The rubber hose according to claim 17, in which embossment is formed on the outer peripheral surface of the fluororubber layer.

10 31. The rubber hose according to claim 17, in which a plurality of ribs are provided along the circumferential direction in a protruding manner on the inner peripheral surface of the fluororubber layer in the joining portion to a counterpart pipe to be inserted therein.

15 32. A method for manufacturing a rubber hose by means of winding in which an intermediate silicone rubber layer having a hardness lower than those of the fabric-reinforced silicone rubber layer and the fluororubber layer and containing an adhesive component for the adhesion with said fluororubber 20 and said fabric-reinforced silicone rubber is provided between the fluororubber layer and the fabric-reinforced silicone rubber layer outside thereof, wherein:

the fluororubber layer sheet is prepared by use of a calender roll;

25 the intermediate silicone rubber is press-coated onto the fluororubber layer sheet to prepare a laminated sheet

composed of the fluororubber layer sheet and the intermediate silicone rubber layer sheet; and

a fabric-reinforced silicone rubber topping sheet,
prepared in advance, is wound on the laminated sheet to produce
5 the rubber hose.

33. The method for manufacturing a rubber hose according to
claim 32, in which an organosilane adhesive is applied onto
the outer peripheral surface of the fluororubber layer,

10 wherein;

the organosilane adhesive is applied after the
fluororubber layer sheet is prepared; and

thereafter the laminated sheet composed of the
fluororubber layer sheet and the intermediate silicone rubber
15 layer sheet is prepared by rubbing the intermediate silicone
rubber into the fluororubber layer sheet.